ETHNIC MINORITIES AND RURAL POVERTY IN LAO PDR*

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Abstract: Ethnic minorities have a significantly higher poverty incidence than the majority in Lao PDR. Based on survey data the determinants of minority poverty are analyzed, the sources of inequality decomposed, and the expected impact of polices to address minority poverty estimated. Minority poverty is found to be due to limited access to resources, while minority resource use tends to be efficient. Yet, large differences in resource use between the minority groups are found. Decomposition shows that unequal access to resources and demographic variables largely explain the majority-minority poverty gap. A strategy for alleviating minority poverty in the Lao PDR is suggested: (1) broad policies covering education, infrastructure and agricultural development can address poverty among ethnic minorities; (2) policies should be tailored to the needs of the individual minority groups.

Keywords: Lao PDR, Laos, poverty, ethnic minorities

JEL-codes: I32, J15, O12, O53

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1. Introduction

Ethnic minority groups are overrepresented among the poor in many countries. This is also the situation in Lao PDR. This report seeks to analyze the determinants of welfare and poverty among ethnic groups in the country, decompose the sources of ethnic inequality, and estimate the impact of polices to address minority poverty. The analysis is based on detailed household data from the Lao PDR Expenditure and Consumption Survey 2002/3 (LECS3). This survey follows two previous ones conducted in 1992/3 and 1997/8.

Poverty estimates and a set of social and economic indicators based on LECS3 are presented in Richter et al. (2005). The present report extends this study by studying determinants of poverty among ethnic minority groups in a multiple regression framework. This allows an analysis of how different factors affect household welfare conditional on other potential determinants and control variables. The impact of ethnicity on poverty is studied through inclusion of ethnic variables, a decomposition of the poverty gap between the majority and minorities and through an estimation of the effects of policies to address ethnic minority poverty. Since the chosen econometric method can have a strong influence on the results, the report also includes a discussion of the methodology and how the empirical model of poverty determinants is related to the reality in Lao PDR.

Earlier studies using regression analysis to analyze poverty in Lao PDR are Kakwani et. al. (2002), Warr (2005) and Andersson, Engvall and Kokko (2005). This report extends these earlier publications by adjusting the estimation method to accommodate for survey design effects embodied in the LECS-data and through an explicit and detailed treatment of ethnic factors. Available studies of ethnic minorities in Lao PDR have been based on qualitative sources and an anthropological approach (notably ADB, 2001; and Goudineau, 2003) or focus on the relationship between ethnicity and development policies (Ireson and Ireson, 1991). This report is based on a more quantitative analysis of a large sample of households, an approach which makes it possible to study general patterns where a large number of factors can be incorporated into the analysis. Furthermore, there is scope to estimate the effects of possible policy interventions. Drawbacks with this approach are that it leaves little opportunity to include non-quantifiable factors and that it is necessary to abstract from some individual traits.

The report proceeds as follows: the next section gives a summary description of the main ethnic groups in Lao PDR; this is followed by a discussion of poverty incidence in the country with a particular focus on patterns of poverty among ethnic minorities; then a theoretical model of household welfare is outlined and the econometric method discussed; the regression results are presented and ethnic aspects of poverty analyzed through decomposition of sources of inequality and estimated effects of alternative policy scenarios. A concluding section summarizes and discusses the results.

1.1 Ethnic minorities in Lao PDR

This section provides a short introduction to the ethno-linguistic (hereafter: ethnic) groups in Lao PDR, drawing on the in-depth analyses of ethnicity found in ADB (2001); Goudineau (2003); Ireson & Ireson (1991); and Lao National Front for Construction (2005). The focus is on aspects of ethnic traditions and livelihoods that may influence economic conditions and welfare. Many important and valuable cultural traits that don't directly affect material welfare might thereby be ignored.

Lao PDR is a multi-ethnic country and a common classification identifies 49 separate ethnic groups (see Table 9 in the Appendix for a full list), whereas sometimes more than 230 groups are identified (ADB, 2001). These ethnic groups are commonly grouped into four main ethnic families: Lao-Tai, Mon-Khmer, Chine-Tibet, Hmong-Mien, and a group of marginal ethnic groups (Lao National Front for Construction, 2005). An alternative classification is commonly used in Lao PDR whereby ethic groups are categorized according to the environment they traditionally inhabit. In this classification the Lao-Tai is called *Lao Loum* or lowland Lao; the Mon-Khmer is *Lao Theung*, midland Lao; and Chine-Tibet and Hmong-Mien are *Lao Soung*, highland Lao.

The **Lao-Tai**, sometimes referred to as ethnic Lao, is the major lowland group inhabiting valleys and river plains across the country. The Lao-Tai can be found throughout mainland Southeast Asia, being the dominant groups in Lao PDR and Thailand. The Lao-Tai has historically enjoyed a dominant position in society, politics and economic relations. Their traditional livelihood is based on cultivation of glutinous rice as the staple crop. The Lao-Tai normally lives in permanent villages cultivating rice in paddies, but may also practice swidden agriculture (slash-and-burn). Agricultural work is shared among women and men. Women are traditionally important decision makers within the household and manage much of the family economy.

The **Mon-Khmer** belongs to the Austroasiatic family. They often live on hillsides and slopes in midland areas. The Mon-Khmer inhabited the area making up present Lao PDR prior to the Lao-Tai. They are concentrated in two parts of Lao PDR, central parts of the northern region (Luangprabang, Oudumxay and adjacent areas) and the south east (Saravane, Sekong, and Attapeu). The Khamu in northern Lao PDR are the most numerous of the Mon-Khmer, and the Lamet, Loven, and So are large southern groups. Traditionally these groups practice swidden rice farming and live in permanent villages although they might move if the fertility of fields within a reasonable distance is depleted. Women tend to do most of the agricultural cultivation while men hunt, fish, build and clear fields. The traditional livelihood of Mon-Khmer could be described as maximizing access to natural endowments, rather than efficient use of inputs into agricultural production (ADB, 2001).

Chine-Tibet groups are concentrated in highland areas in the far north of Lao PDR. The provinces of Luangnamtha and Phongsaly bordering China have large Chine-Tibetan populations. These groups began to migrate into present day Lao PDR during the nineteenth century. They tend to reside on the upper slopes or tops of mountains where ordinary (non-glutinous) rice is grown in swidden agriculture. Corn is often planted to supplement the rice. Villages are traditionally semi-migratory, moving when fields have been exhausted. Women's status is lower than among the Lao-Tai.

The highland Chine-Tibetans has been described as maximizers of production and labor inputs (ADB, 2001).

The **Hmong-Mien** is Lao Soung highlanders and sometimes also referred to as Hmong-Yao. They are concentrated in mountainous areas of central Lao PDR (Xiengkhuang province), and scattered across the northern region. The Hmong-Mien began to migrate into present day Lao PDR during the nineteenth century and took up residence on the upper slopes or mountains tops. Just as the Chine-Tibetans, they grow ordinary rice in swidden agriculture which is supplemented by corn. Villages are semi-migratory, moving to settle in new areas when soils have degraded. Women's status is lower among Hmong-Mien than the Lao-Tai. Residing in highland areas with scarce resources, the Hmong-Mien has developed agricultural methods that serve to maximize available resources (ADB, 2001).

There are several **other ethnic minorities** in Lao PDR, besides the four main families discussed above. These are both marginal groups living in rural areas, as well as Chinese, Vietnamese, and South Asians concentrated in urban areas. It is outside the scope of this report to give a full overview of this diverse group.

1.2 Patterns of poverty in Lao PDR

Thanks to the availability of poverty data from LECS3 and earlier surveys, it is possible to examine trends in poverty over time as well as the geographic and ethnic distribution of poverty. The statistics presented here are based on poverty headcount measures developed by Richter et. al. (2005). A household is characterized as poor if its per capita consumption falls below a total poverty line allowing for a sufficient food requirement plus a basket of non-food goods and services. The consumption measures and poverty lines are consistent across all three LECS-surveys.

Table 1 summarizes data on poverty headcount in the total population and rural poverty across regions, provinces, and ethnic groups. Poverty incidence has fallen substantially since LECS1, although the rate of progress has slowed down somewhat during the second five year period. In 2002/3, 33.5 percent of the survey population was characterized as poor, compared with earlier poverty rates of 46.0 percent in 1992/3 and 39.1 percent in 1997/8.

Table 1 provides detailed rural poverty rates. These are consistently higher than total poverty headcount, where also urban households are included. The fast decline in rural poverty between LECS1 and 2 changed into a somewhat slower decline between LECS2 and 3. The higher poverty rate, in combination with the large population share in rural areas, translates into a very high rural share of the poor.

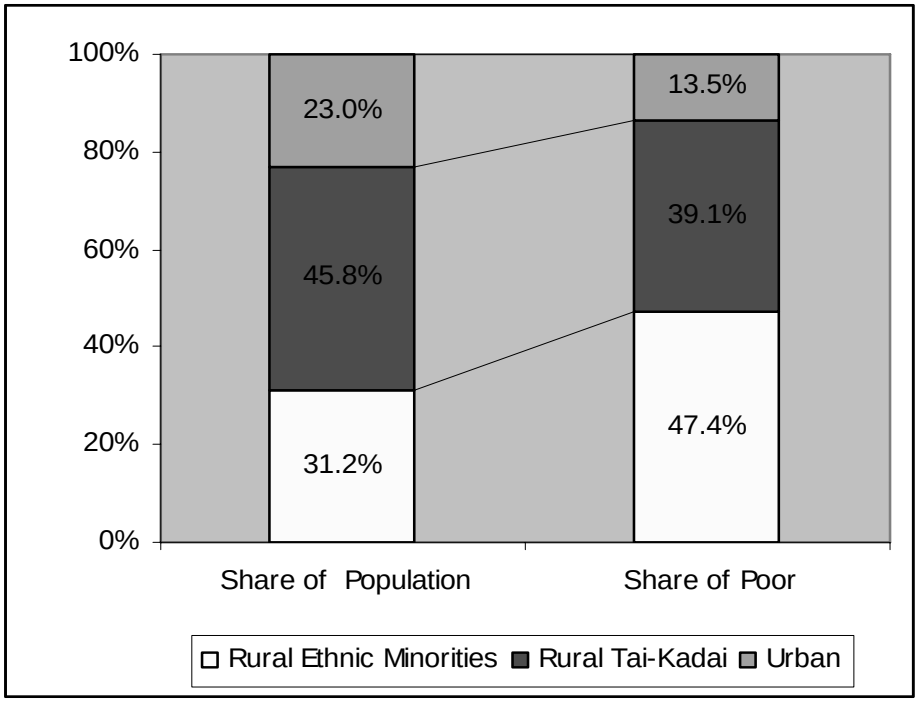
Table 1: Total Poverty Headcount and Rural Poverty by Region, Province and Ethnic Family.

	1992/93	1997/98	2002/03	Change 92/93 to 97/98	Change 97/98 to 02/03
Total Poverty					
Lao PDR	**46.0%**	**39.1%**	**33.5%**	**-6.9%**	**-5.6%**
Rural Poverty					
Lao PDR	**51.8%**	**42.5%**	**37.6%**	**-9.3%**	**-4.8%**
Vientiane Municipality	**52.9%**	**11.1%**	**20.2%**	**-41.8%**	**9.0%**
Northern Region	**55.5%**	**48.6%**	**39.1%**	**-6.9%**	**-9.5%**
Phongsaly	72.0%	58.4%	52.7%	-13.6%	-5.7%
Luangnamtha	55.4%	53.5%	22.1%	-1.9%	-31.4%
Oudomxay	47.3%	70.6%	46.2%	23.3%	-24.4%
Bokeo	63.6%	40.0%	20.6%	-23.7%	-19.3%
Luangprabang	62.4%	42.3%	40.6%	-20.1%	-1.7%
Huaphanh	73.3%	72.6%	54.8%	-0.8%	-17.7%
Xayabury	14.9%	18.3%	23.7%	3.4%	5.4%
Central Region	**48.5%**	**41.5%**	**39.0%**	**-7.0%**	**-2.5%**
Xiengkhuang	71.6%	43.9%	46.6%	-27.7%	2.7%
Vientiane Province	31.9%	29.0%	19.9%	-2.9%	-9.2%
Borikhamxay	16.8%	27.0%	37.0%	10.2%	10.0%
Khammuane	49.8%	49.3%	35.9%	-0.5%	-13.4%
Savannakhet	58.3%	44.4%	48.0%	-13.9%	3.6%
Xaysomboun SR	-	63.4%	31.9%	-	-31.4%
Southern Region	**51.9%**	**41.6%**	**35.5%**	**-10.2%**	**-6.1%**
Saravane	48.0%	40.3%	57.1%	-7.7%	16.8%
Sekong	67.0%	52.9%	44.6%	-14.1%	-8.2%
Champasack	46.8%	39.6%	19.8%	-7.2%	-19.7%
Attapeu	82.3%	49.0%	47.3%	-33.3%	-1.7%
Ethnic Families					
Lao-Tai			28.6%		
Mon-Khmer			54.4%		
Chine-Tibet			40.2%		
Hmong-Mien			45.3%		
Other			52.8%		

Source: Authors' calculations based on LECS1-3.

The overall reduction in rural poverty during the period with available data hides substantial differences in developments across provinces and regions. In the five years between LECS2 and 3 rural poverty rates fell most rapidly in the northern part of the country, which had earlier been in the weakest position. By contrast, poverty increased in some rural areas which had lower poverty rates five years earlier. Most notable are the rising rates in rural areas of Borikhamxay, Saravane, and Vientiane Municipality.

The last section of Table 1 presents some comparisons of rural poverty across ethnic families. Very large differences in poverty incidence between the main ethnic families are apparent. All minority groups show substantially higher poverty headcount rates than the majority Lao-Tai. The Mon-Khmer and the Other groups are in particularly weak positions. But as noted earlier, ethnic groups are concentrated in certain geographic areas and the categories thus overlap to some extent. The Mon-Khmer for example is concentrated in Luangprabang, Oudumxay in the north, and Saravane, Sekong and Attapeu in the south. All of these provinces have rural poverty rates above the national average. By merely studying these descriptive statistics is not possible to determine whether the minority groups are poorer due solely to ethnic reasons or dependent on differences in local conditions.



Source: Authors' calculations based on LECS-data.

Figure 1: Population and Poverty Headcount Shares 2002/03, by Urban or Rural and Ethnicity.

Figure 1 provides further illustration of the concentration of poverty in rural areas and among minority households. The figure illustrates shares of urban population, and rural population divided into majority Lao-Tai and the ethnic minority groups. An overwhelming majority of both population (77.0%) and the poor (86.5%) reside in rural areas. Furthermore, individuals in rural areas belonging to ethnic minorities are heavily overrepresented among the poor, as they make up less than a third of the population, but constitute almost half of the poor in Lao PDR.

2. Framework of Analysis

As noted above, there are many possible approaches to analyzing ethnicity and poverty. While earlier studies of Lao PDR have largely been based on qualitative sources, this report use household survey data which enables a study of general patterns based on a large sample.

As shown in the previous section, poverty is concentrated to rural areas and ethnic minorities are heavily overrepresented among these rural poor. Based on this, the analysis will focus on rural households. A further rationale to focus on rural poverty is that ethnic aspects and traditional livelihoods can be expected to have a larger impact on rural poverty.

Ethnic differences in rural welfare can stem from many different sources. Ethnicity may affect choices of agricultural technology, the division of labor, habitat, and social organization. The presence of discriminatory polices may also affect welfare through inequality in access to public goods such as infrastructure and education. The remainder of this section outlines a framework of analysis for studying determinants of rural welfare and sources of ethnic differences.

2.1 Rural welfare and its determinants

In the empirical development literature it is common to analyze determinants of poverty by relating measures of welfare to various individual, household, and community characteristics in a multiple regression framework (Singh et. al., 1986). This method makes it possible to identify determinants of welfare, sources of differences between population groups and compare the effects of possible policy interventions. However, although the overall methodology is becoming standardized, there are a number of theoretical issues that deserve attention. These concern the choice of dependent and independent variables, the econometric specification, estimation method as well as the interpretation of the results.

The first issue is the choice of welfare measure or dependent variable. In principle there are three main alternative welfare measures: consumption expenditure, income or binary indicators of poverty. Here consumption expenditure is used as welfare measure. The following paragraphs discuss the strengths and shortcomings of this specific measure.

Both consumption expenditure and income can be justified as a measure of welfare, since both measure the ability to obtain goods and services. In many cases the measures would produce similar results, but both also have potential weaknesses. Both consumption and income measures fail to incorporate some important aspects of welfare, such as consumption of commodities supplied by, or subsidized by, the public sector (for example, schools, health services, and roads) and several dimensions of the quality of life (consumption of leisure and the ability to lead a long and healthy life).

The decision to use a consumption-based rather than an income-based measure of individual welfare in this study is motivated by several considerations. First, income can be seen as a measure of welfare opportunity, whereas consumption may be interpreted as a measure of welfare achievement (Deaton, 1997). Since not all income is consumed, nor is all consumption financed out of income, the two measures typically differ. Consumption is arguably a more appropriate indicator if we are concerned with realized, rather than potential, welfare. Second, consumption typically fluctuates less than income. Individuals rely on savings, credit, and transfers to smooth the effects of fluctuations in income on their consumption. In particular, it is common that temporary increases in income are not consumed immediately, but rather spread out over longer time periods. It can therefore be argued that consumption provides a more accurate and less volatile measure of an individual's permanent income and welfare over time. Third, some researchers and policymakers hold the belief that survey respondents are more willing to reveal their consumption behavior than their income. Finally, a relatively large proportion of the labor force in developing countries is engaged in self employed activities where it is particularly difficult to measure income accurately. Similarly, many individuals are engaged in multiple income generating activities in a given year, and the process of recalling and aggregating income from different sources can be difficult.

An alternative welfare measure would be a binary measure indicating whether or not an individual belongs to a poor household. Yet, this would discard a lot of the available information: using a continuous variable like consumption expenditure exploits more of the available information since it takes into account consumption

differences below as well as above the poverty line. In addition, this measure would introduce additional sensitivity to the choice of poverty line.

The consumption measure is expressed in real terms where price differences between regions and survey months have been controlled for. This adjustment of nominal measures of consumption to real values requires a price deflator. There are two main alternatives for calculating a real consumption measure, the money metric approach and the welfare ratio (Deaton, 1997). In the money metric approach individual weights reflecting the consumption patterns of each household are used, whereas if the welfare ratio is employed the weights are the same for all households. Here a welfare ratio is calculated with a weighting corresponding to the poverty line (reflecting the consumption patterns of the poor). Using this method, prices have been adjusted to the median 2002/03 urban Vientiane price level.

The consumption measure includes the total value of food and non-food goods and services, whether purchased, home-produced, or received as a gift or payment in kind, as well as imputed use values for owner-occupied housing and household durable goods. As noted above, a significant omission from the consumption measure is consumption of commodities subsidized or supplied by the public sector free of charge.

Since surveys collect data at the household and not the individual level, consumption totals are calculated on a household basis. It is possible to either treat the household as the unit whose welfare is being analyzed or to use some rule to divide household consumption between its members. As an individual basis for measurements is conceptually clearer, this is the approach used here. There are a variety of methods for calculating individual consumption measures, involving needs-based adult equivalence scales (Deaton, 1997). Still, none are completely satisfactory since they require strong assumptions. Even if such adjustments are made, it is still possible that the distribution of income within households systematically differs from what is assumed. In the light of these practical difficulties in compensating for differences in requirements between adults and dependents, a straight per capita normalization is used.

While consistent with standard practice, the use of per capita normalization of consumption still involves assumptions that may affect welfare comparisons. For instance, as a welfare measure, per capita normalization implies equal requirements, in monetary terms, for each household member, regardless of age, sex, or other characteristics. However, in the case of food requirements, it is arguable that children's requirements are less than those of adults; the opposite may be true for other goods and services, such as education. Another problem is that per capita normalization don't allow for economies of scale in household size; the prospect that it is less expensive for two persons to live together than it is for them to live separately. While there is evidence that economies of scale exist, varying largely with consumption patterns within the household, it seems clear that the scale effects are not homogenous across household sizes (Lanjouw and Ravallion, 1995). Efforts to adjust for economies of scale would risk introducing biases. This further motivates a straight per capita normalization. Still, some caution is in place since this model builds on a unitary view of the household and may fail to capture significant intra household differences.

A further theoretical issue is the choice of explanatory variables. In principle, the choice should be based on a model for household welfare determination. On a basic level welfare depends on access to production factors: labor, capital, land, and technology, as well as the quality of these. In addition, the role of human capital in the form of education and experience has often been emphasized as an important determinant of welfare (Mincer, 1958). As noted above, household income and consumption are shared among members of the household. This introduces a need to account for household composition, such as household size or the share of working age adults relative to dependent children and elders. The environment in which the household or individual operates influences the outcome of the production process in many ways. The degree and nature of competition varies between locations, and affects the prices in the market. Institutions and public policy also influence the conditions for economic activity, and may vary between locations. Similarly, access to and the quality of public infrastructure is important.

Access to savings and other sources of non-production income may have direct effects (in terms of higher consumption potential) as well as indirect effects (through better access to capital and other production factors). To complicate the issue further, it should be recognized that there is probably a cumulative two-way relationship between income from production activities and savings potential: the households that are able to generate much income are probably also able to save and may use the savings for investments that enhance their productive capacity. Conversely, poor households may be caught in a poverty trap, where their incomes are too low to allow them to set aside money for investments that could raise output.

2.2 Household model

Based on the discussion of theoretical considerations above, an empirical model of household welfare can be outlined. Per capita consumption expenditure, measured at the household level, depends on three types of variables. At the core of the model are the production factors that the household use to generate consumption capacity. Secondly, the household composition crucially influences consumption. Finally, the productivity of the household is influenced by infrastructure that varies between villages.

The econometric specification is based on the theory of agricultural household models (Bardhan and Udry, 1999; Singh et al., 1986). The model (1) has logarithmic real per capita consumption expenditure as dependent variable. The explanatory variables fall into the three main groups: household production factors, household composition, and village infrastructure. This yields a model of the form:

$$\ln C_i = \alpha + \beta_1 X_i + \beta_2 V_i + \beta_3 W_i + \varepsilon_i \qquad (1)$$

where $\ln C_i$ is the log per capita consumption of household *i*, the variables X_i, V_i, and W_i are vectors of household production factors, household composition and village infrastructure variables, α is a constant, and β_1, β_2 and β_3 are the corresponding vectors of coefficients, and ε_i is a normally distributed random error term. Furthermore the effects of ethnicity and location are controlled for (not included in specification (1)). Most variables are measured at the household level: the infrastructure and location variables are defined at the village and province level. This

formulation is attractive since it has a relatively straightforward functional form while being consistent with established models for household welfare. The regression model permits inferences to be made about the direction and strength of the relationship between a set of independent variables and the dependent variable.

There are several potential effects of ethnicity on welfare that can be captured in this model. First, it is possible that ethnic origin has a direct impact on consumption. On the other hand, it is possible that ethnicity has an indirect effect that leaves minority households with lower endowments of production factors, village infrastructure or less favorable household composition. A third potential channel is differences in resource utilization that would influence the return minority households obtain on their endowments. This can be thought of as an effect stemming from differences in livelihoods and patterns of maximization.

It is important to distinguish between these three channels of ethnic inequality, since policy prescriptions and the prospects for improvements may be quite different. For example, there is a difference between a situation where minority welfare are lower solely because they are of a certain ethnicity (direct effect) and one where the lower welfare level can be explained as a result of lower levels of endowments or lower returns (indirect effects). In the former case, it may be difficult to develop polices to improve the situation of minority households; in the latter case, providing more resources to minorities or provide training to promote more efficient resource utilization may improve the situation. The presence of direct effect can be readily tested by including ethnic variables in multiple regression models, but identifying indirect effects requires a decomposition of sources of poverty.

2.3 Variables

The following paragraphs outline five groups of explanatory variables. The choice of variables has been guided by an effort to avoid highly correlated variables that would introduce identification problems. This is necessary to make it possible to distinguish the individual contribution of each factor. The choice is also limited to exogenous variables that are expected to influence household consumption without it self being determined by consumption. This excludes potentially endogenous variables, such as assets determined by current income.

Another issue related to variable choice is the gap between theoretical concepts like capital, technology, and infrastructure, on the one hand, and available empirical data, on the other hand. These concepts are typically difficult to operationalize and measure with any accuracy. In many cases, it is therefore necessary to settle for imperfect proxy variables. The remainder of this section discusses the chosen groups of explanatory variables.

i) Household production factors. The variables in this category are intended to reflect the production capacity of the household and include measures for the inputs of land, physical capital, human capital, and technology.

Land is a very important factor for determining the welfare of rural households. Variables for two categories of land, irrigated and un-irrigated land, are included. This separation accounts for expected differences in productivity. The variable does not control for land quality within the categories.

- The log area of the household's irrigated and un-irrigated land (owned and/or operated by household).

Including variables for household **physical capital** poses some challenges. Many measures of capital would create problems of identification. Still, livestock is included under the assumption that household holdings of cattle, buffaloes, and pigs are exogenously determined.

- Variables for the number of farm animals: cattle; buffaloes; and pigs.

Apart from the physical input of labor, it is also important to account for **human capital**, which is related to the education level of the household's adult members. The household's expenditure on education of children is not included, as it cannot be considered exogenous. The investments in schooling undertaken today do not determine the present welfare level of the household, but are instead dependent on the household's present welfare: it is mainly households with relatively high incomes that can afford to invest substantially in education. It should be noted that education may affect economic welfare in many different ways. For example it can influence both returns within economic activities and access to such activities. In addition education may limit fertility and thus reduce the number of dependent children. So, education may raise productivity, increase access to non-farm employment, improve the ability to set up a household business, raise productivity in farming, and decrease the burden of dependants. In the regression model the maximum educational attainment of any adult household member is included, as this has been shown to be a good indictor of human capital in developing countries (Jolliffe, 2002). Variables capturing the presence of literate men and women in the household are also included. The hypothesis is that female education has a different return than male education.

Hence, we include three measures of educational attainment in the household, based on the hypothesis that human capital (as measured by formal education and literacy) contributes positively to welfare. These are:

- Maximum education level attained by any adult (aged 18 to 59 years) in the household.

- Variable to indicate the presence of a literate adult (18 years or older) household member. Separate variables for male or female.

Variables related to **technology** are intended to capture the choice of activity (agriculture or business) as well as the household choice of agricultural methods. A potentially important technologic choice is that between households relying solely on physical labor and those using machinery. Another choice is whether or not to use chemical fertilizers. Furthermore, while agriculture is the vastly dominant activity in the sample households, it is not the only one. In Lao PDR, a household business is often the major complementary activity to subsistence agriculture. We therefore include variables to indicate whether the household use agricultural machinery, chemical fertilizers and whether it runs a non-agricultural business.

- An agricultural mechanization variable indicating if the household has access to a tractor.

- Chemical fertilizer usage variable to control for the farming technology used.

- Household business variable.

ii) Household composition. Since the per capita consumption measure is generated from information on household consumption, it is necessary to control for the size and composition of the household. This creates problems for the identification of the labor input variable: there is no strict separation between variables for labor input and for controlling for household composition. When interpreting the results it is important to note that demographic variables combine these two effects.

The data set includes detailed information regarding the size of the household and the distribution of household members across gender and age groups. The number of adults in productive age is used to control for the household's labor input. We thus include the following variables to for **labor input** and the size and composition of the household:

- Number of adults aged 18-59.

- Dependency ratio, calculated by dividing the number of dependents with the total number of household members. Dependents are defined as children and youth under 18 and household members aged 60 or more.

Based on experience from other countries households with a higher dependency ratio are expected to display lower per capita consumption (Lanjouw and Ravallion 1995; Deaton and Paxson 1998). Similarly there might be a negative of an increasing number of adult family members. This would be due to a declining marginal contribution from each additional working member of the household.

Gender might affect household income, as it is commonly observed that male and females face different economic opportunities. A variable is included to control for the effect of the gender of the head of household.

- Gender, measured as the sex of the head of the household.

iii) Variables for **village infrastructure** are included to capture the effects of infrastructure on household welfare. The village data in LECS3 offers a number of potential variables to reflect rural household access to infrastructure and services. Four variables are included:

- Variables indicating whether the village has road access during the dry season only, or all year round.

- Village access to electricity. Electricity access could possibly be endogenous at the household level since it would be influenced by household consumption. However, this variable is defined at the village level, and it can be considered exogenous in that the decision to provide a village with electricity is external to the household.

Table 2: Variables and Definitions.

Variable	Definition and Comment
Dependent Variable	
Cons. Per Capita	Real Per Capita Consumption
Household Production Factors	
Irrigated Land Area	Log household irrigated farmland holdings (unit: 100 square meter)
Unirrigated Land Area	Log household unirrigated farmland holdings (unit: 100 square meter)
Number of Cattle	Log number of cattle owned by household
Number of Buffalo	Log number of buffalo owned by household
Number of Pigs	Log number of pigs (local or commercial) held by household
Literate Female	1 if household has literate female adult; 0 otherwise
Literate Male	1 if household has literate male adult; 0 otherwise
Household Business	1 if household runs a non-agricultural business; 0 otherwise
Max Education Index	0 if highest educational attainment in household is pre-primary, 1 if primary, 2 if lower secondary,
Agricultural Mechanisation	1 if household has access to tractor; 0 otherwise
Fertilizer Use	1 if household used chemical fertilizer during last planting season; 0 otherwise
Household Composition	
Dependency Ratio	Ratio of dependents, below 18 year and above 59, versus adults 18-59
Adults	Log number of adults in household
Male Head of Household	1 if Male Head of Household; 0 if Female Head of Household
Village Infrastructure	
Access to Dry Season Road	1 if village accessible by truck during dry season only; 0 otherwise
Access to All Season Road	1 if village accessible by truck during all seasons; 0 otherwise
Electricity Access	1 if village has access to electricity; 0 otherwise
Healthservice Access	1 if village has access to community health worker, medical practioner, nurse, hospital, or health post; 0 otherwise
Low Altitude	1 if village is located in lowland area; 0 otherwise
High Altitude	1 if village is located in both lowland and highland area; 0 otherwise
Mid Altitude	1 if village is located in highland area; 0 otherwise
Ethnicity	
Lao-Tai	1 if head of household is Lao-Tai; 0 otherwise
Mon-Khmer	1 if head of household is Mon-Khmer; 0 otherwise
Chine-Tibet	1 if head of household is Chine-Tibet; 0 otherwise
Hmong-Mien	1 if head of household is Hmong-Mien; 0 otherwise
Other Ethnic	1 if head of household is Other Ethnic groups: 0 otherwise
Province Variables	
Province	1 if household is located in province; 0 otherwise

- Village access to health services. A dummy variable indicating whether the village has a community health worker, medical practioner, nurse, hospital, or health post.

- Variables to control for altitude or elevation of the village are included due to its implications for agricultural practices as well as for market access.

iv) Variables for **ethnicity** are included to control for the effect of ethnic origin. The LECS3 data set includes information on self-identified ethnic identity. The 50 groups are aggregated into five variables corresponding to the main ethnic families in Lao PDR.

- Ethnic variables indicating whether the head of the household has identified themselves as belonging to the main Lao-Tai, any of three minority (Mon-Khmer, Chine-Tibetan or Hmong-Mien) ethnic families, or the residual other group.

v) **Province variables** are included to control for the fixed effects of local conditions regarding geography, climate, institutions, policy, competition, and other variables that cannot be directly measured.

- Province variables for the 18 provinces of Lao PDR (see Table 10 in the Appendix for a complete list).

2.4 Data and estimation issues

The primary data source for this study is LECS3. The survey gathered information on 8092 households from all 18 provinces in Lao PDR, but the relevant data set is limited to the 8048 households for which village level data is available. The main parts of this analysis are based on a subset of 6474 rural households.

Average values for the regression variables for rural households are presented in Table 3. It should be noted that the chosen variables are not correlated with each other to any significant degree. An exception is the strong negative correlation between the variables denoting road access during the dry season only and all year road access which is expected and should not pose any complication for the estimation.

Table 3: Summary Statistics Explanatory Variables. All rural households

Variable	All Rural Households
Consumption (per month)	KIP 154740
Household Production Factors	
Irrigated Land Area	0.05 Ha
Unirrigated Land Area	1.80 Ha
Number of Cattle	1.3 animals
Number of Buffalo	1.2 animals
Number of Pigs	1.1 animals
Literate Female	57%
Literate Male	80%
Household Business	14%
Max Education Index	1.70
Agricultural Mechanisation	20%
Fertilizer Use	28%
Household Composition	
Dependency Ratio	56%
Adults	2.95 persons
Male Head of Household	97%
Village Infrastructure	
Access to Dry Season Road	17%
Access to All Season Road	57%
Electricity Access	33%
Healthservice Access	74%
Low Altitude	50%
High Altitude	31%
Mid Altitude	19%
Ethnicity	
Lao-Tai	59%
Mon-Khmer	26%
Chine-Tibet	4%
Hmong-Mien	10%
Other Ethnic	1%

Source: Authors' calculations based on LECS3.

The estimation method must take in consideration the nature of the LECS3 survey through which the data was gathered (Deaton, 1997). This involves compensating for survey design effects as the LECS3 survey is stratified and clustered. There are 54 strata made up of 3 household types (urban and rural with or without road) in 18 provinces. The 450 sample villages form clusters or primary sampling units. The estimation is adjusted to take this design into account when calculating standard

errors. The regression is weighted to provide a consistent estimate of the population regression function (Deaton, 1997).

3. Estimation Results

The results of the estimation of the regression model are presented in Table 4. A first comment concerns the fit and the interpretation of the model. The model is estimated with an R^2 of 0.38 based on the sample of 6474 rural households, which indicates that the model explain a reasonable share of the variation of consumption in the sample. Since the dependent variable is in logarithmic form, the estimated regression coefficients measure the percentage change in per capita consumption within the household from a unit change in the continuous independent variables (this interpretation does not hold for dummy or indicator variables).

It can also be noted that all significant variables display expected signs. This indicates that the variables included in the model do indeed influence household welfare as expected. The following paragraphs take a more detailed look at the estimated coefficients group-wise, starting with production factors.

3.1 Household production factors and welfare

The land variables show a positive contribution to welfare, albeit with a low degree of statistical significance. Still, this result reinforces the view that access to farm land contribute to household consumption. The contribution from ownership of farm animals is in general consistent with expectations. Cattle ownership seems to be of particular importance. Also buffaloes and pig ownership has positive, albeit insignificant, coefficients. The variables related to agricultural technology – mechanization and chemical fertilizers - appear to be related with a strong effect on consumption.

The biggest individual impact on consumption capacity, however, does not seem to be directly related to agriculture, but rather to a move away from agriculture, since the variables for families with a household business records a large and significant positive coefficient. Households with a business have a consumption capacity that is higher than that of similar households that do not operate any household business. It appears clear that this result provides support for policies focusing on diversification of rural activities.

All variables for education and human capital are strongly significant, and it appears that literacy has a particularly positive impact for women. The coefficient for female literacy is higher than that for male literacy. This is an interesting observation with potentially important policy implications. If investments in female literacy give larger welfare effects than investments in male literacy, there are clear reasons for focusing such investments on women. However, the reason for the weaker results for males may be due to less variation in male literacy. As shown in Table 3, there is a literate adult man in 80 percent of the households, compared to 57 percent having a literate female member. Therefore the variable for male literacy might not capture differences between households' human capital endowments to the same extent.

Besides literacy, more advanced education has a value as shown by the maximum education variable. Raising the educational level of the most advanced household

member, e.g. from lower to upper secondary schooling, raises the family's average per capita consumption level significantly.

Table 4: Regression Results.

Variable		
Dependent Variable	Cons. Per Capita	
Constant	12.443	***
	(102.76)	
Household Production Factors		
Irrigated Land Area	0.015	*
	(1.81)	
Unirrigated Land Area	0.007	
	(0.83)	
Number of Cattle	0.017	***
	(2.72)	
Number of Buffalo	0.009	
	(1.55)	
Number of Pigs	0.008	
	(1.11)	
Literate Female	0.063	***
	(3.68)	
Literate Male	0.032	*
	(1.79)	
Household Business	0.249	***
	(10.51)	
Max Education Index	0.073	***
	(6.38)	
Agricultural Mechanisation	0.125	***
	(5.67)	
Fertilizer Use	0.062	**
	(2.24)	
Household Composition		
Dependency Ratio	-1.381	***
	(-26.89)	
Adults	-0.519	***
	(-21.65)	
Male Head of Household	0.076	*
	(1.71)	
Village Infrastructure		
Access to Dry Season Road	0.106	**
	(2.01)	
Access to All Season Road	0.108	***
	(2.84)	
Electricity Access	0.053	*
	(1.71)	
Healthservice Access	0.021	
	(0.60)	
High Altitude	0.011	
	(0.29)	
Mid Altitude	-0.009	
	(-0.22)	
Ethnicity		
Mon-Khmer	-0.084	**
	(-2.21)	
Chine-Tibet	0.158	**
	(2.05)	
Hmong-Mien	0.060	
	(1.04)	
Other Ethnic	-0.202	***
	(-2.65)	
Province Variables		
Phongsaly	-0.229	**
	(-2.15)	
Luangnamtha	0.029	
	(0.27)	
Oudomxay	-0.101	
	(-1.00)	
Bokeo	-0.088	
	(-0.90)	
Luangprabang	-0.140	
	(-1.51)	
Huaphanh	-0.211	**
	(-2.08)	
Xayabury	-0.104	
	(-1.10)	
Xiengkhuang	-0.227	*
	(-1.75)	
Vientiane Province	-0.061	
	(-0.69)	
Borikhamxay	-0.154	
	(-1.57)	
Khammuane	-0.171	*
	(-1.82)	
Savannakhet	-0.260	***
	(-2.87)	
Saravane	-0.342	***
	(-3.69)	
Sekong	-0.144	
	(-1.41)	
Champasack	-0.018	
	(-0.18)	
Attapeu	-0.342	***
	(-3.41)	
Xaysomboun SR	-0.146	
	(-1.51)	
Observations	6474	
R^2	0.377	
F-ratio	33.55	***
Degrees of Freedom	[41, 358]	

T-values in parentheses
Estimated Coefficient statistically significant at a (***) 99%, (**) 95%, and (*) 90% confidence levels.
Source: Authors' calculations based on LECS3.

3.2 Household composition and welfare

Turning to household composition it is clear that both dependency ratio and the number of adults are strongly negatively associated with our welfare measure. These results imply that larger families typically have lower per capita consumption, and that the welfare level is reduced further if the family has many members that can be categorized as dependents. This is consistent with cross country studies indicating that higher fertility increases poverty (Eastwood & Lipton, 1999).

The positive impact of labor that could be expected is not obvious in the model, but this depends partly on the distribution of observations and partly on the diminishing marginal productivity of labor at the household level (keeping other inputs constant). Additional working family members are left with less productive tasks, and their lower marginal productivity will therefore reduce per capita welfare.

The variable for male head of households exhibits a positive and statistically significantly value. This indicates that there could be a gender bias against the approximately 3% of households that is headed by a female. An implication for this finding is that additional attention should be paid to promoting equal opportunities for women. It should be noted that very small share of households that are headed by females could deviate from the majority in other respects not captured by this model and a further in-depth analysis is needed to establish causal relationships.

3.3 Village infrastructure and welfare

The village level variables related to access to infrastructure and public services mostly display coefficients of expected signs, but many of these are statistically insignificant which call for a cautious interpretation.

The relationship between road access and household welfare are controlled for by two variables, one for dry season access only and one for all season road access (leaving no road access as the base case). The standard assumption is that households living in villages without roads will suffer from a lack market of access, increasing the costs of inputs, lowering the price of sold goods, and limiting the possibility for non-agricultural employment. Rice, the basic food for most Lao households, is of central importance: aside from own consumption, rice sales provide the income needed to purchase other goods. The transaction costs for rice can be expected to be higher for households located in villages with limited road access. There seems to be support for this interpretation; households in villages with dry season road access record a positive impact and there is an additional impact of all season road access.

3.4 Spatial variation

The province variables in the regression allow an analysis of the fixed effect of geographic location. With Vientiane Municipality as the standard, the influence of household location in other provinces tends be negative. This indicates that there is a significantly positive effect of a location close to the capital city where market access, competition and other external conditions are beneficial. More important for the purpose of this analysis is the fact that the provincial variables control for geographic effects and allows an interpretation of the unique effect of ethnicity.

3.5 Ethnicity and household welfare

A first point to note is that the results in Table 4 cast some doubt on the established views regarding the significance of ethnicity. While some ethnic variables are significant there is no clear pattern in comparison with the default case, the Lao-Tai majority population. The Mon-Khmer and Other ethnic families display negative and significant coefficients, but the variables for Chine-Tibetan and Hmong-Mien categories are positive. This indicates ethnicity as such cannot explain poverty among minorities when controlling for other factors.

As discussed in section 2.2 above, all aspects of ethnic effects on poverty cannot be captured in this basic regression analysis. It is possible that there are other indirect channels from ethnicity to poverty. In order to explore the indirect effects of ethnicity, some further analytical steps shall be taken. First, the differences between ethnic groups can be further tested through separate regressions for the ethnic families. This makes it possible to examine whether the marginal effects of the welfare determinants are different across the ethnic families.

Summary statistics by ethnicity as shown in Table 5 give a picture of the variation across different groups and provides a picture of unequal access to production factors, as well as substantial differences in household composition and village infrastructure.

Table 5: Summary Statistics, Rural Households by Ethnic Family.

	Lao-Tai	Mon-Khmer	Chine-Tibet	Hmong-Mien	Other
	Mean	Mean	Mean	Mean	Mean
Observations	3483	1914	335	646	75
Consumption	KIP 174020	KIP 123385	KIP 132302	KIP 134316	KIP 113690
Household Production Factors					
Irrigated Land Area	0.09 Ha	0.02 Ha	0.01 Ha	0.01 Ha	0.00 Ha
Unirrigated Land Area	1.87 Ha	1.65 Ha	1.80 Ha	1.76 Ha	1.77 Ha
Number of Cattle	1.36 animals	0.63 animals	0.88 animals	3.04 animals	0.63 animals
Number of Buffalo	1.32 animals	1.08 animals	1.07 animals	1.38 animals	0.74 animals
Number of Pigs	0.80 animals	1.15 animals	1.65 animals	2.26 animals	0.41 animals
Literate Female	76%	37%	9%	17%	29%
Literate Male	88%	73%	24%	68%	66%
Household Business	19%	6%	0%	7%	5%
Max Education Index	2.01	1.25	0.66	1.49	1.11
Agricultural Mechanisation	27%	10%	2%	11%	18%
Fertilizer Use	44%	6%	6%	5%	7%
Household Composition					
Dependency Ratio	55%	58%	56%	63%	57%
Adults	2.92 persons	2.96 persons	3.16 persons	3.13 persons	2.55 persons
Male Head of Household	96%	97%	99%	99%	96%
Village Infrastructure					
Access to Dry Season Road	16%	18%	11%	19%	19%
Access to All Season Road	65%	51%	14%	41%	75%
Electricity Access	44%	16%	0%	20%	40%
Healthservice Access	81%	67%	45%	64%	69%
Low Altitude	68%	31%	1%	14%	48%
High Altitude	13%	46%	94%	76%	32%
Mid Altitude	20%	23%	5%	10%	20%

Source: Authors' calculations based on LECS3.

Land, a crucial factor of production for rural households, seems to be rather evenly distributed across the ethnic families. The average landholdings of the majority Lao-Tai are similar to those of minority groups, but this land is to a higher extent irrigated. Other factors influencing agricultural productivity are less evenly distributed. Fertilizer use ranges from 44% of households among Lao-Tai to 5% among Hmong-Mien; cattle ownership averages more than three animals in Hmong-Mien households, but less than one in Mon-Khmer and Chine-Tibetans; more than one in four Lao-Tai

households but only one in fifty Chine-Tibetan households have access to a tractor, and so forth. The overall picture is one of great variation in the endowments of production factors.

The picture is similar regarding household composition. Minority households are burdened by more dependents and tend to have more adult family members. However, the largest differences are probably to be found in the village infrastructure. Almost 65% of Lao-Tai lives in villages with all season road access and more than 80% have health services in their village. The corresponding figures for Chine-Tibetan households are 14% for road access and 45% for health services. These summary statistics indicate that uneven access to resources could be a crucial part of the explanation for differences in welfare across ethnic groups.

Still, access to resources is not the sole determinant of welfare. Efficient use is also crucial. It is commonly noted that livelihoods, agricultural practices and work habits differ between ethnic groups. These differences may reflect a situation where groups living in highland areas have developed practices that make efficient use of the available scarce resources. Thus households with different ethnic origin may differ in their resources use and compensate (or aggravate) the differences in access to resources. Through separate regressions (Table 6) it is possible to study resource use among the different ethnic families.

Some highly interesting patterns emerge from the separate regression models for the five ethnic groups as presented in Table 6. Looking at the explanatory power of the five estimates some interesting patterns emerge. For Lao-Tai and Mon-Khmer the R^2 are on the same level as for the aggregate household sample, for Hmong-Mien the explanatory power is lower, but for Chine-Tibetan it is substantially higher.

Table 6: Regression Results, Rural Households by Ethnic Family.

Variable	Lao-Tai	Mon-Khmer	Chine-Tibet	Hmong-Mien	Other Ethnic
Dependent Variable	Cons. Per Capita	Cons. Per Capita	Cons. Per Capita	Cons. Per Capita	Cons. Per Capita
Constant	12.531 ***	11.978 ***	12.146 ***	12.372 ***	12.577 ***
Household Production Factors	(88.40)	(81.94)	(40.06)	(44.67)	(57.26)
Irrigated Land Area	0.016 *	0.026 *	-0.013	-0.019	dropped
	(1.68)	(1.88)	(-0.37)	(-0.76)	
Unirrigated Land Area	-0.005	0.041 ***	0.034	0.052 ***	-0.055
	(-0.58)	(2.94)	(1.11)	(2.51)	(-1.43)
Number of Cattle	0.012	0.015	0.050 ***	0.030 *	0.013
	(1.41)	(1.63)	(3.94)	(1.88)	(0.37)
Number of Buffalo	0.005	0.019 ***	0.012	0.035 *	0.054
	(0.65)	(2.05)	(0.85)	(1.70)	(1.40)
Number of Pigs	0.002	0.001	0.027	0.013	0.051
	(0.24)	(0.11)	(1.54)	(0.80)	(1.28)
Literate Female	0.075 ***	0.035	-0.123 **	0.079	-0.075
	(3.37)	(1.51)	(-2.26)	(1.27)	(-1.08)
Literate Male	-0.001	0.070 ***	-0.048	0.092 **	0.011
	(-0.03)	(2.77)	(-1.09)	(2.10)	(0.17)
Household Business	0.259 ***	0.224 ***	dropped	0.142	-0.186
	(9.64)	(4.88)		(1.57)	(-1.56)
Max Education Index	0.114 ***	0.028 **	-0.001	0.072 ***	-0.080
	(6.63)	(2.03)	(-0.07)	(2.64)	(-1.23)
Agricultural Mechanisation	0.131 ***	0.108 ***	-0.008	-0.057	0.023
	(5.14)	(2.66)	(-0.03)	(-0.99)	(0.44)
Fertilizer Use	0.057 *	0.129 ***	-0.144 **	-0.070	0.118
Household Composition	(1.94)	(2.79)	(-2.10)	(-0.82)	(1.05)
Dependency Ratio	-1.510 ***	-1.258 ***	-0.964 ***	-1.171 ***	-0.891 ***
	(-22.19)	(-16.80)	(-8.27)	(-7.64)	(-5.20)
Adults	-0.573 ***	-0.479 ***	-0.340 ***	-0.455 ***	-0.391 **
	(-17.47)	(-11.71)	(-5.86)	(-10.55)	(-2.23)
Male Head of Household	0.069	0.076	-0.050	-0.207	0.284
Village Infrastructure	(1.49)	(0.70)	(-0.62)	(-1.31)	(1.11)
Access to Dry Season Road	0.136 **	0.131 *	-0.178 *	-0.137	dropped
	(2.01)	(1.82)	(-1.67)	(-1.43)	
Access to All Season Road	0.121	0.098 ***	0.139	0.008	0.843 ***
	(2.19)	(1.97)	(1.35)	(0.06)	(4.05)
Electricity Access	0.016	0.102 *	dropped	0.275 ***	-0.318 ***
	(0.45)	(1.73)		(3.25)	(-2.91)
Healthservice Access	0.027	0.046	-0.107	0.057	-1.231 ***
	(0.48)	(1.20)	(-1.47)	(0.56)	(-9.15)
High Altitude	0.018	-0.013	-0.017	0.148	0.728 ***
	(0.31)	(-0.26)	(-0.06)	(1.08)	(4.68)
Mid Altitude	-0.048	0.040	-0.157	-0.013	-0.770 ***
	(-1.02)	(0.75)	(-0.51)	(-0.08)	(-5.22)
Province (coefficients not reported)					
Observations	3483	1914	335	646	75
R^2	0.363	0.391	0.442	0.304	0.677
F-ratio	22.92 ***	17.62 ***	-	-	-
Degrees of Freedom	[37, 354]	[36, 349]	[18, 63]	[29, 196]	[5, 78]

T-values in parentheses
Estimated Coefficient statistically significant at a (***) 99%, (**) 95%, and (*) 90% confidence levels.
Estimates controlled for province fixed effects (values of fixed effects not included in table).
Source: Authors' calculations based on LECS3.

Besides the fit of the model, the coefficient estimates display substantial differences between the ethnic families. The Lao-Tai and Mon-Khmer tend to have coefficients that are similar in direction and size to the full sample of rural households. This indicates that these groups have similar patterns of resource utilization. The Lao Soung – Chine-Tibetan and Hmong-Mien ethnic families –display different patterns. Several coefficient estimates for these groups differ markedly from those of the other ethnic families. Examples are the negative impact of female education among the Chine-Tibetans and the insignificant impact of household business among the

Hmong-Mien. The variables for agricultural technology also display consistently negative coefficients (albeit only statistically significant for fertilizer use among Chine-Tibetans), indicating that households relying on traditional agricultural methods experience higher welfare levels. The Lao Soung also shows different returns from village infrastructure, with a negative impact of access to dry season road among the Chine-Tibetans and statistically insignificant effects among Hmong-Mien.

These results show that there are substantial differences in the welfare generating processes between the ethnic families. This implies that there are reasons to believe that indirect effects, in the form of differences in access to and returns from resources, are relevant for understanding welfare differences among ethnic groups.

4. Decomposition of Ethnic Sources of Poverty

This far the analysis of ethnic sources of welfare differences has shown that there is some direct impact of ethnicity; furthermore there are substantial differences in access to resources, and large differences in resource use as show through the separate regressions. Through a decomposition the relative impact of these factors can be studied.

4.1 Decomposition method

Decomposition can be used to analyze the shares of the consumption gap between the majority and ethnic minorities that are due access to resources and resource utilization. This technique, commonly used for analyzing labor market discrimination, is known as a Blinder-Oaxaca decomposition (Blinder, 1973; Oaxaca, 1973). Following Psacharopoulos and Patrinos (1994), this decomposition will here be used to analyze differences in consumption between rural households with different ethnic belonging.

The mean consumption differential between two groups can be decomposed as follows:

$$\ln \hat{C}^a - \ln \hat{C}^b = \hat{\beta}_1^a\left(\overline{X}^a - \overline{X}^b\right) + \hat{\beta}_2^a\left(\overline{V}^a - \overline{V}^b\right) + \hat{\beta}_3^a\left(\overline{W}^a - \overline{W}^b\right) + \overline{X}^b\left(\hat{\beta}_1^a - \hat{\beta}_1^b\right) + \overline{V}^b\left(\hat{\beta}_2^a - \hat{\beta}_2^b\right) + \overline{W}^b\left(\hat{\beta}_3^a - \hat{\beta}_3^b\right) \qquad (2)$$

Total difference	= Production factors	+ Household composition	+ Village infrastructure	+ Differences in returns

where $\ln \overline{C}^a$ and $\ln \overline{C}^b$ represent the mean log earnings of the majority *a* and the minority *b*. The first right hand side component in (2) is the consumption differential due to differences in endowments of production factors of the groups (here weighted by the parameters estimated for the majority). The second component is the differential due to differences in household composition, the third that due to differences in village infrastructure and the final component is that attributable to between-group differences in the returns to all individual characteristics.

To avoid a comparison of households that not only differ in ethnicity but also basic conditions such as location, climate, external economic conditions, and institutional factors, the decomposition are done using matched samples of minority and majority households from the same districts. This is done to eliminate differences due to geographic factors.

4.2 Consumption gap decomposition results

The results from the decompositions (Table 7) reinforce the view that unequal access to resources is important for explaining the consumption gap. Looking jointly at all minorities, the consumption gap to the majority can be fully explained by differences in endowments. This indicate that a major part of the higher poverty rates among minorities can be explained by lower less access to land, more dependents and worse infrastructure than the Lao-Tai. The most important of these is the category production factors, which accounts an overwhelming part of the gap. Resource use (or returns) are according to this analysis more efficient among minorities and even serve to lessen the impact of the unequal access to resources as indicated by the negative value for the total difference in returns.

Table 7: Consumption Gap Decomposition. Matched Samples.

Consumptiongap Analysis	All Minorities	Mon-Khmer	Chine-Tibet	Hmong-Mien	Other Ethnic
Share Due To Difference in Endowments					
Household Production Factors	80%	68%	159%	150%	20%
Household Composition	25%	14%	22%	70%	0%
Village Infrastructure	8%	0%	65%	13%	35%
Total Difference in Endowments	**112%**	**82%**	**246%**	**234%**	**55%**
Share Due To Difference in Returns	**-12%**	**18%**	**-146%**	**-134%**	**45%**

Source: Authors' calculations based on LECS3.

Looking at the detailed results of the decomposition some further patterns emerge. Again the Lao Soung, Chine-Tibetans and Hmong-Mien, display similarities. Both these groups are highly efficient in their utilization of scarce resources and are able to compensate for unequal access to resources (Here shown as negative signs of the differences in returns.) This indicates that these groups have adapted their livelihoods to the conditions in upland areas. Similar decomposition exercises analyzing ethnic differences in Vietnam also showed a compensating behavior among minorities (van de Walle and Gunewardena, 2001). The difference to the Mon-Khmer is apparent; they use resources less efficiently than the majority population. This reinforces the view that the Lao Soung are efficient maximizers of production and labor inputs, while the Mon-Khmer rely on seeking out abundant natural environments, something that might have become increasingly difficult by time.

This analysis has so far highlighted some possible explanations to the differences in welfare between ethnic families in Lao PDR. First, households from different ethnic groups have highly different access to resources and use these in different ways. By studying the impact on poverty of changes to resource endowments, the economic significance of these results can be estimated. The following section provides an estimation of the impacts of possible policy interventions.

5. Policy Scenarios

A final step in this empirical inquiry is an analysis of the estimated effects on welfare and poverty of changes to the endowments of minority households. This can be thought of as a comparison of possible policy interventions to improve the welfare of minority groups, and a test of the economic significance of the results provided this far.

5.1 Scenario Estimation Method

The estimation of the welfare effects of alternative scenarios is built on a further extension of the earlier econometric model (1). First, a base case scenario is estimated where household consumption is predicted using the estimated coefficients and values for the relevant ethnic subgroup:

$$\ln \hat{C}^b = \hat{\alpha}^b + \hat{\beta}_1^b \overline{X}^b + \hat{\beta}_2^b \overline{V}^b + \hat{\beta}_3^b \overline{W}^b \quad (3)$$

where $\ln \hat{C}^b$ is the predicted consumption under the base case scenario, $\hat{\alpha}^b$, $\hat{\beta}_1^b$, $\hat{\beta}_2^b$, and $\hat{\beta}_3^b$ are the estimated constant and coefficients; and $\overline{X}^b$, $\overline{V}^b$, $\overline{W}^b$, are the mean endowments of group *b*. Predicted values under alternatives scenarios are derived as follows:

$$\ln \hat{C}_j^b = \hat{\alpha}^b + \hat{\beta}_1^b \overline{X}^a + \hat{\beta}_2^b \overline{V}^a + \hat{\beta}_3^b \overline{W}^a \quad (4)$$

where $\ln \hat{C}_j^b$ is the predicted consumption, for group *b* under scenario *j*. Example (4) illustrates a scenario where the original endowments, $\overline{X}^b$, $\overline{V}^b$, $\overline{W}^b$, are replaced by those for the majority group *a*: $\overline{X}^a$, $\overline{V}^a$, $\overline{W}^a$.

5.2 Scenarios

To study the impact of possible policy programs on welfare among the ethnic families, five potential scenarios have been constructed. These are illustrated in Box 1, below. A detailed description of which variables are altered under each of the scenarios can be found in Table 11 in the Appendix.

Using formula (4) consumption and poverty estimates are derived for each scenario for all ethnic families. To make prediction possible it is assumed that the household benefit from changes in endowments, without bearing the costs for financing investments or reaping additional, supplemental benefits such as labor income in development projects. These assumptions can be justified in the Lao PDR context given the large reliance on aid financing and the common use of external labor for development projects. It should also be noted that the predicted consumption under different scenarios is derived under an assumption of constant distributional patterns within each ethnic group.

Box 1: Policy Scenarios.

I. **Infrastructure.** In this scenario it is assumed that heavy investments in rural infrastructure are carried out. The effect is to bring the level of minority households' access to dry and wet season road as well as electricity and healthcare to the same level as those for rural Lao-Tai households. Furthermore it is assumed that the area of irrigated land is increased to the level of the majority.

II. **Education**. In this scenario schooling is extended to ensure that literacy, maximum education and business skills are brought to the same level as that of the majority population.

III. **Household**. In this scenario household composition and literacy is increased to the level of the majority. This could be through programs for family planning and adult learning.

IV. **Agriculture.** In this scenario all endowments of agricultural production factors (land, livestock and agricultural technology) are made equal to those of the majority population.

V. **All**. In the final scenario all of the above policy programs are implemented.

5.3 Results: Alternative Scenarios

The estimated impact of the policy scenarios for different minority groups is illustrated in Table 8. The estimated percentage change in consumption and the new poverty headcounts are illustrated for each scenario.

Table 8: Consumption Changes and Poverty Headcount under Policy Scenarios, by Ethnic Family.

Scenario	All Minorities	Mon-Khmer	Chine-Tibet	Hmong-Mien	Other Ethnic
Base Case					
Poverty Head Count	50.8%	54.4%	40.2%	45.3%	52.8%
I. Infrastructure					
Consumption Change	4.8%	3.5%	9.8%	6.9%	8.2%
Poverty Headcount	47.2%	51.2%	32.4%	41.1%	49.7%
II. Education					
Consumption Change	8.2%	9.8%	-18.8%	12.9%	-10.6%
Poverty Headcount	44.4%	45.5%	65.5%	36.7%	64.2%
III. Household					
Consumption Change	9.7%	8.0%	-10.9%	23.8%	-4.2%
Poverty Headcount	43.1%	47.4%	55.7%	29.4%	58.7%
IV. Agriculture					
Consumption Change	7.0%	10.3%	-3.4%	-3.7%	9.6%
Poverty Headcount	45.4%	45.0%	44.4%	48.7%	49.7%
V. All					
Consumption Change	27.8%	28.8%	-11.4%	33.2%	3.3%
Poverty Headcount	28.9%	30.4%	56.0%	23.7%	52.8%

Source: Authors' calculations based on LECS3.

Studying the effect on all minority households we find encouraging results. In each policy scenario there are a positive effect on consumption and an associated fall in poverty headcount. This indicates that there could be substantial benefits in terms of

poverty alleviation through investments in rural minority households. In scenario V. where all variables are altered the estimated poverty headcount for the minority households are actually comparable to the 28.6% rate among rural Lao-Tai (see Table 1 for comparison).

But these overall results hide striking differences between ethnic families. Both Mon-Khmer and Hmong-Mien show positive effects that are in line with expectations. But Chine-Tibetans show surprising results as consumption rates fall and poverty increases in most scenarios. Behind these results lies the peculiar structure of original endowments and somewhat different patterns of returns among the Chine-Tibetans. The main conclusion from analyzing these scenarios is that polices can be a powerful instrument to affect ethnic minority welfare, but that special attention is needed when adapting policy programs to the needs of individual ethnic groups.

6. Conclusions

This report has sought to improve our understanding of ethnic aspects of rural poverty in Lao PDR. The main basis for the analysis is an analytical model for household welfare in a multiple regression framework and LECS3 household survey data. The analysis was extended with a decomposition of sources of ethnic welfare inequality and an analysis of the possible impact of policy interventions. This concluding section summarizes the results, key implications, and limitations of the analysis.

Descriptive poverty statistics clearly show that poverty is concentrated among ethnic minority groups. All minorities have higher poverty headcount rates than the majority Lao-Tai, with the highest rural poverty rates found among the Mon-Khmer. However, when controlling for other determinants of poverty there is no clear indication that ethnicity as such explains the higher rates of poverty. The causes of minority poverty must therefore be sought among access to and use of productive resources. A decomposition shows that unequal access to resources, both within the household and in the form of public services, as well as different household demographics seems to explain a large share of minority poverty. To the extent that ethnic minorities have access to land, infrastructure and education, they tend to make use of it at least as efficiently as the majority. Yet there is a large difference between ethnic groups regarding resource use; Chine-Tibet and Hmong-Mien tend to make more efficient use of available resources than the Mon-Khmer.

This analysis identifies some main elements of a multi-ethnic poverty reduction strategy for Lao PDR. Two policy implications are: (1) broad policies covering both education, access to infrastructure and agricultural development are needed to address the differences in economic opportunities facing ethnic minorities; (2) poverty alleviation policies should be tailored to the needs of individual ethnic minority groups in order to maximize the impact.

Some caution is in place when interpreting the results. They should be seen as indicators of broad patterns and trends, rather than exact measures of specific relationships between variables. A second concern is related to the continuous changes in the Lao PDR economic environment, local as well as regional and international. Such changes may lead to rapid fluctuations in economic conditions and changes in behavior. Regular collection and analysis of primary data is therefore crucial to understand the underlying processes of change and development.

7. References

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Appendix: Tables and Charts

Table 9: Ethno-linguistic Families.

	Ethnic Group	Ethnolinguistic Family	Lao PDR Classification
1	Lao	Lao-Tai	Lao Loum
2	Phoutai	Lao-Tai	Lao Loum
3	Tai	Lao-Tai	Lao Loum
4	Leu	Lao-Tai	Lao Loum
5	Nhuane	Lao-Tai	Lao Loum
6	Yang	Lao-Tai	Lao Loum
7	Xaek	Lao-Tai	Lao Loum
8	Thaineua	Lao-Tai	Lao Loum
9	Keumu	Mon-Khmer	Lao Theung
10	Prai	Mon-Khmer	Lao Theung
11	Cingmoon	Mon-Khmer	Lao Theung
12	Phong	Mon-Khmer	Lao Theung
13	Thian	Mon-Khmer	Lao Theung
14	Irdue	Mon-Khmer	Lao Theung
15	Bid	Mon-Khmer	Lao Theung
16	Lamed	Mon-Khmer	Lao Theung
17	Samtao	Mon-Khmer	Lao Theung
18	Katang	Mon-Khmer	Lao Theung
19	Makong	Mon-Khmer	Lao Theung
20	Tri	Mon-Khmer	Lao Theung
21	Yru	Mon-Khmer	Lao Theung
22	Trieng	Mon-Khmer	Lao Theung
23	Taoey	Mon-Khmer	Lao Theung
24	Yae	Mon-Khmer	Lao Theung
25	Brao	Mon-Khmer	Lao Theung
26	Katu	Mon-Khmer	Lao Theung
27	Harak	Mon-Khmer	Lao Theung
28	Ouy	Mon-Khmer	Lao Theung
29	Krieng	Mon-Khmer	Lao Theung
30	Cheng	Mon-Khmer	Lao Theung
31	Sadang	Mon-Khmer	Lao Theung
32	Xuay	Mon-Khmer	Lao Theung
33	Nhahern	Mon-Khmer	Lao Theung
34	Lavy	Mon-Khmer	Lao Theung
35	Pako	Mon-Khmer	Lao Theung
36	Kmer	Mon-Khmer	Lao Theung
37	Toum	Mon-Khmer	Lao Theung
38	Nguane	Mon-Khmer	Lao Theung
39	Meuang	Mon-Khmer	Lao Theung
40	Kri	Mon-Khmer	Lao Theung
41	Akha	Chine-Tibet	Lao Soung
42	Singsili	Chine-Tibet	Lao Soung
43	Lahou	Chine-Tibet	Lao Soung
44	Sila	Chine-Tibet	Lao Soung
45	Rangy	Chine-Tibet	Lao Soung
46	Lolo	Chine-Tibet	Lao Soung
47	Ho	Chine-Tibet	Lao Soung
48	Hmong	Hmong-Mien	Lao Soung
49	Ilmain	Hmong-Mien	Lao Soung
50	Other	Other	Other

Source: Lao National Front for Construction, 2005.

Table 10: Provinces and Regions.

	Province	Region
1	Vientiane M	Vientiane M
2	Phongsaly	North
3	Luangnamtha	North
4	Oudumxay	North
5	Bokeo	North
6	Luangprabang	North
7	Huaphanh	North
8	Xayabury	North
9	Xiengkhuang	Central
10	Vientiane	Central
11	Borikhamxay	Central
12	Khammuane	Central
13	Savannakhet	Central
14	Saravane	South
15	Sekong	South
16	Champasack	South
17	Attapeu	South
18	Xaysomboun SR	Central

Table 11: Policy Scenarios.

Variable	I. Infrastructure	II. Education	III. Household	IV. Agriculture	V. All
Household Production Factors					X
Irrigated Land Area	X			X	X
Unirrigated Land Area				X	X
Number of Cattle				X	X
Number of Buffalo				X	X
Number of Pigs				X	X
Literate Female		X	X		X
Literate Male		X	X		X
Household Business		X			X
Max Education Index		X			X
Agricultural Mechanisation				X	X
Fertilizer Use				X	X
Household Composition					
Dependency Ratio			X		X
Adults			X		X
Male Head of Household			X		X
Village Infrastructure					
Access to Dry Season Road	X				X
Access to All Season Road	X				X
Electricity Access	X				X
Healthservice Access	X				X

Comment: Those variables that are replaced by the mean value of the majority population in each scenario are indicated by X.